WHAT IS CLAIMED IS:

1. A process for the isomerization of a feedstream comprising C_5-C_6 hydrocarbons said process comprising charging hydrogen and a feedstream comprising at least normal C_5-C_6 hydrocarbons into an isomerization zone and contacting said hydrogen and feedstream with an isomerization catalyst at isomerization conditions to increase the branching of the feedstream hydrocarbons and produce an isomerization effluent stream comprising at least normal pentane, normal hexane, methylbutane, dimethylbutane, and methylpentane; wherein said catalyst is a solid acid catalyst comprising a support comprising a sulfated oxide or hydroxide of at least an element of Group IVB (IUPAC 4) of the Periodic Table, a first component selected from the group consisting of at least one lanthanide series element mixtures thereof, and yttrium, and a second components selected from the grip consisting of platinum group metals and mixtures thereof.
2. The process of Claim 1 wherein the atomic ratio of the first component to the second component is at least about 2.
3. The process of Claim 1 wherein the catalyst further comprises from about 2 to about 50 mass-% of a refractory inorganic-oxide binder.
4. The process of Claim 1 wherein the first component is selected from the group consisting of lutetium, ytterbium, thulium, erbium, holmium, terbium, combinations thereof and yttrium.
5. The process of Claim 1 wherein the first component is ytterbium.

6. The process of Claim 1 wherein the catalyst further comprises a third component selected from the group consisting of iron, cobalt, nickel, rhenium, and mixtures thereof.

7. The process of Claim 1 further comprising passing the isomerization effluent stream to a product separator to separate a hydrogen rich stream from an isomerized product stream.

8. The process of Claim 7 further comprising passing the isomerized product stream to a stabilizer to separate a C_4 and lighter stream from a C_5-C_6-rich stream.

9. The process of Claim 8 further comprising passing the C_5-C_6-rich stream to a deisohexanizer to separate a methyl-pentane and normal hexane-rich stream and recycle the methyl-pentane and normal hexane-rich stream to the isomerization zone.

10. The process of Claim 9 wherein the deisohexanizer comprises a single fractionation column and said methyl-pentane and normal hexane-rich stream is withdrawn as a sidecut stream.

11. The process of Claim 9 wherein the C_5-C_6-rich stream enters the deisohexanizer through an intermediate column elevation through a first inlet point and the methyl-pentane and normal hexane-rich stream is withdrawn at a point located below the first inlet point.

12. The process of Claim 9 wherein the deisohexanizer also separates an overhead stream comprising methylbutane, normal pentane, and dimethylbutane, and a bottoms stream comprising cyclohexane and higher boiling hydrocarbons.

13. The process of Claim 8 further comprising passing the C_5-C_6-rich stream to an adsorptive separation zone to separate a methyl-pentane and normal hexane-rich stream and recycle the methyl-pentane and normal hexane-rich stream to the isomerization zone.

14. The process of Claim 13 wherein said adsorptive separation zone is operated under vapor phase or liquid phase conditions.

15. The process of Claim 13 wherein said adsorptive separation zone comprises at least four operationally distinct beds of adsorbent and said beds are operated in a simulated moving bed mode.

16. The process of Claim 1 wherein said isomerization effluent stream is blended into a gasoline pool to produce a motor fuel.

17. The process of Claim 1 wherein said feedstream includes C_7 and higher boiling hydrocarbons.

18. The process of Claim 1 wherein said isomerization effluent is passed directly to a stabilizer where C_4 and lighter hydrocarbons are removed from said effluent and the remainder of the effluent is passed directly to said deisohexanizer column.

19. The process of Claim 8 further comprising separating the C_4 and lighter stream into at least an LPG product stream.

20. The process of Claim 1 wherein said reaction zone includes a series of two reactors, the feed stream first enters a reactor operating at a temperature in the range of 120° to 225°C and said effluent is recovered from a reactor operating at a temperature in the range of 60° to 160°C.